Abstract of the Invention

A method of measuring machine alignment offset of an optical machine having an alignment system, so that subsequent processing of substrates on set of optical machines can be performed in a machine-independent manner. The optical machine forms overlayed images of first and second patterns formed on either one or two reticles onto a substrate at respective first and second levels. The method of the invention includes forming a virtual zero-offset alignment pattern and a virtual zero-offset metrology pattern and imaging first and second metrology patterns on the substrate at the first and second levels, respectively. The second metrology pattern is aligned to the first metrology pattern using the zero-offset alignment pattern so that the exposures are performed in an overlayed manner. The first and second metrology patterns are based on the virtual zero-offset metrology pattern. An image of the overlayed first and second metrology patterns formed on the substrate is obtained using the alignment system of the optical machine. The virtual zero-offset metrology pattern is compared to corresponding portions of the image of the overlayed metrology patterns to deduce an offset from an ideal alignment of the first and second metrology patterns. Zero-offset alignment patterns for one or more jobs may also be created so that the jobs can be run without an extra step of determining the job-dependent offset for each job.